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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 15 DEC 1999

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Applicant's or agent's file reference	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International application No. PCT/AU 98/00199	International filing date (day/month/year) 26 March 1998	Priority Date (day/month/year) 26 March 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl.⁶ B01D 29/09, C12C 7/16, 7/24, 11/11, C12H 1/07		
Applicant 1. MILLER, Peter Anthony		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.																
2.	<p>This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheet(s).</p>																
3.	<p>This report contains indications relating to the following items:</p> <table border="0"> <tr> <td>I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input checked="" type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input type="checkbox"/> Certain observations on the international application</td> </tr> </table>	I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input checked="" type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input type="checkbox"/> Certain documents cited	VII	<input type="checkbox"/> Certain defects in the international application	VIII	<input type="checkbox"/> Certain observations on the international application
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Date of submission of the demand 27 September 1999	Date of completion of the report 25 November 1999
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer G. CARTER Telephone No. (02) 6283 2154

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages 1,3,, as originally filed,
pages , filed with the demand,
pages 2, filed with the letter of 23 November 1999.
pages, filed with the letter of
pages , filed with the letter of
- ☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 4, filed with the letter of 23 November 1999.
- ☒ the drawings, figs 1-2 , as originally filed,
pages , filed with the demand,
Pages filed with the letter of
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , filed with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

Claims 5 and 6 do not define the same invention as claim 1 which relates to a band filter. Claim 5 relates to dosing clarified wort with absorbents and claim 6 relates to a programmed relationship between process variables in a fermentation process.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
- ☒ the parts relating to claims Nos. **claims 1-4 and 7**

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-4, 7	YES
	Claims	NO
Inventive step (IS)	Claims 1-4, 7	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-4, 7	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

GB 2280857 is the nearest related art and is by the same applicant. However this citation does not disclose a membranous filter media capable of submicronic separation specially for filtering wort and beer.

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filtered fully automatically with the exclusion of air, whereby the residual dissolved products in the thin layers of filtered solids formed are largely recoverable producing a dewatered dischargeable filter cake and a sterile filtrate. With the application of membranous filter bands with particulate cut-off sizes of 0.01-1.0 micron, malt and grain grist for mashing are milled to a mean particle size of 20-100 micron. Such values lead to a much improved yield of fermentable sugars in mashing as well as in washing the spent grist after filtration. According to the invention, the finely divided grist is mashed in a reactor-type of vessel 201, whereby after heating in stages by means of a heat transfer jacket 213 vacuum is applied by a vacuum generating plant 216 and the agitated contents of the reactor are blown with live steam through a distributor 217, whereby with comparatively low temperatures and steam consumption undesirable off-taste producing volatiles are removed. from the mash and the precipitation of the hot-break and the breakdown of enzymatic materials as well as sterile conditions are achieved. Subsequently, the agitated contents of the mashing reactor are cooled to precipitate the proteinaceous matter of the cold-break and then filtered by the band filter plant 202. According to the invention, the finely ground husks and other residual hard materials of the mash are used as filter aid to help remove solids and colloids down to 0.01 micron, whereby *membranous* bands with 0.01 micron particle size cut-off are employed. The dewatered filter cake after desweetening is then discharged.

The cooled, filtered, sterile wort is then transferred to the reactor-like fermentation vessels 203 where, according to a further central aspect of the present invention, in order to maintain the wort both before, during and after fermentation free from turbidity caused by the precipitation of protein-like substances, adsorbents such as silica, resins, molecular sieves, etc are added to the wort before and/or during the fermentation process. The purpose of this is to target and remove the maximum quantity of remaining subsequent haze-forming components still in the wort as well as those metabolically produced by the yeast cells during fermentation and thereby, in effect, achieve a stabilized beer direct from the fermenter. According to the invention, to achieve quality reproducibility and efficient removal of haze-forming substances during fermentation a programmed empirical relationship over the period of the batch-wise fermentation between the temperature, pressure and carbon dioxide evolution in the fermenter by means of controllers 223, 220, 218 is maintained. The yeast cells and adsorbent are held protectively by the agitator 222

Claims

1. A process for the production, clarification and purification of wort and beer utilizing membranous filter media affording sub-micronic, sterile separation and thereby achieving significant cost savings and reduction in environmental pollution caused by conventional brewing processes, thereby characterized, that band filters 202, 204 with a filter chamber through which a filter band capable of sub-micronic separation is intermittently transportable over a support surface that divides the filter chamber into a lower filtrate chamber and an upper turbid liquid chamber, whereby the turbid liquid chamber has a lid-like form and the filter band during the operation when a pressure differential in the filter chamber develops is sealed between the movable dependent edges of the turbid liquid chamber, are employed for the clarification of the processed liquids, namely wort and beer.
2. A process according to Claim 1, thereby characterized, that mash for filtering to produce wort is made from ground malt and/or grain with a mean particle size from 20-100 micron.
3. A process according to Claim 1, thereby characterized, that the mash after heating is subjected to vacuum and blown with live steam while under vacuum.
4. A process according to Claim 1, thereby characterized, that the mash after heating is cooled to produce the cold-break before filtration.
5. A process for the production of beer, thereby characterized, that to clarify and stabilize the beer the clarified wort is dosed with adsorbents such as silica, resins, molecular sieves etc. before and/or during the fermentation.
6. A process for the production of beer, thereby characterized, that the fermentation in the fermenter 203 is controlled by a programmed relationship between temperature, pressure and carbon dioxide evolution during the course of the fermentation.
7. A process for reclaiming and recycling recovered liquids from the beer production process, thereby characterized, that a band filter or filters 211, with a filter chamber through which a filter band capable of sub-micronic separation is intermittently transportable over a support surface that divides the filter chamber into a lower filtrate chamber and an upper turbid liquid chamber, whereby the turbid liquid chamber has a lid-like form and the filter band during the operation when a pressure differential in the filter chamber develops is sealed between the movable dependent edges of the turbid liquid chamber, are employed for the purpose of purifying, sterilizing and recycling effluents produced in the brewing process.